MSc Departmental Seminar

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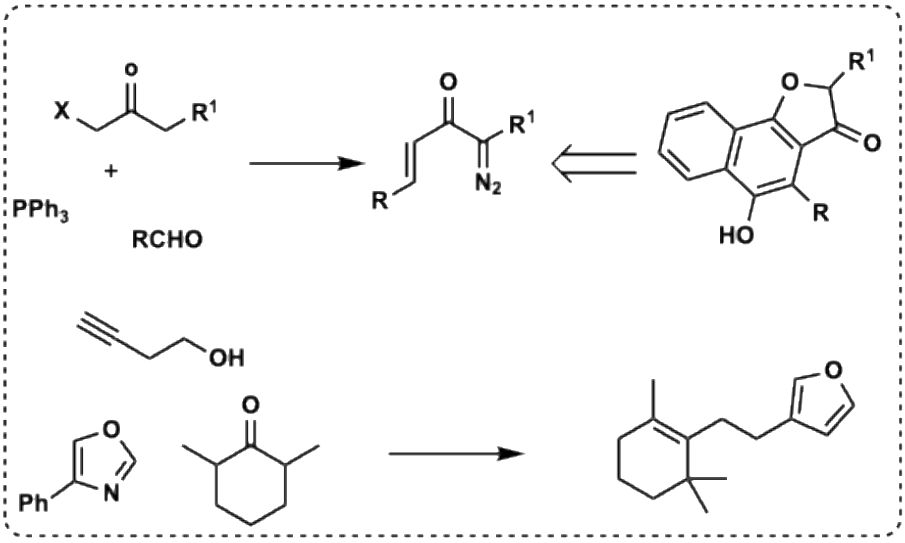
Tuesday, August 6, 2024 at 1:00 p.m. (Room: CSF-1302)

Synthesis and Utilization of Novel Diazo-Enones; Total Synthesis of Furan based Target Molecules



Containing an α,β-unsaturated carbonyl moiety and the diazo functionality, diazo-enones and their derivatives, are a unique subclass of α-diazocarbonyl compounds.[1] With selective conditions developed to activate the α,β-unsaturated carbonyl as a Micheal acceptor or dienophile, or the diazo unit a carbene precursor, these reagents have shown great potential for the construction of complex organic frameworks.[2] This work focused on new methods of constructing this class of valuable α-diazocarbonyl compounds through approaches that avoid the traditional reactions with diazomethane.

In addition, explorations into the utility of these multifunctional reagents have led to the construction of complex polycyclic heteroaromatic compounds, through the development of a novel Hauser-Kraus type annulation. The traditional Hauser-Kraus transformation consists of a formal [4 + 2] cycloaddition involving the reaction of stabilized phthalides,

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[1] *J. Org. Chem.* **2011**, *76*, 1

[2] a) *Org. Lett.* **2921**, *23*, 559
b) *J. Org. Chem.* **2011**, *76*, 1

which generate benzo[*c*]furans (reactive diene) upon treatment with bases, with α,β-unsaturated compounds (dienophile) to construct substituted naphthalene-type systems upon loss of a leaving group.[3] It was envisioned that the diazo-enones could potentially replace the traditional α,β-unsaturated compounds as the dienophile source in this type of cycloaddition. Recently, our preliminary investigations into the use of these reagents in the Hauser-Kraus reaction has led to the synthesis of substituted naphthofuran molecules, a structural motif found in various natural products (e.g., Furomollugin), via a one-pot reaction that forms two new C–C and one new C–O bonds. The details regarding starting materials synthesis and optimization studies of the key reaction will be discussed. Finally, this talk will discuss our recent total synthesis efforts toward the furan containing antimicrobial natural product isomicrocionine-3.[4] The synthetic approach highlights a novel 3-substituted furan synthesis via a microwave mediated [4 + 2]/retro-[4 + 2] reaction and cumulates in the 7-step (longest linear sequence) synthesis of the target molecule. Insights into the successes and challenges of all three projects will be presented.

[3] *Chem. Rev.* **2007**, 107, *5*, 1892
[4] *J. Nat. Prod.* **2008***, 71, 204*